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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/038,957	01/02/2002	K. Ranji Vaidyanathan	003248.00042	2156

22908 7590 06/02/2004

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EXAMINER	
MAYES, MELVIN C	
ART UNIT	**PAPER NUMBER**
1734	

DATE MAILED: 06/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/038,957	VAIDYANATHAN ET AL.	
	Examiner	Art Unit	
	Melvin Curtis Mayes	1734	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 March 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8 and 12-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8,12-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

(1)

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

(2)

Claims 1, 5, 7, 8, 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Allaire et al. 5,024,978 in view of Jang et al. 5,936,861.

Allaire et al. disclose a method of making a ceramic matrix composite comprising: combining a fiber reinforcement material such as a single fiber or fiber bundle with powdered ceramic matrix material suspended in a thermoplastic vehicle containing thermoplastic polymer to form a coated continuous fiber tow or single fiber; forming cut fiber lengths into a fiber-parallel array or lay-up, applying moderate heating and pressure to reform the array into a relatively dense composite prepreg; heating the prepreg to a binder removal temperature and consolidating to a dense ceramic matrix composite by hot pressing. Allaire et al. disclose providing a suspension of 70 volume % ceramic powder and 30 volume % thermoplastic vehicle (col. 8, lines 20-42). Allaire et al. do not disclose making a lay-up of fiber by using a movable assembly to deposit coated fiber on a working surface.

Jang et al. teach that three-dimensional composite material objects can be made in a cost effective fabrication process from continuous fiber reinforced composite material in a layer-by-layer manner by using a dispensing head moved relative to a base member to dispense a mixture of reinforcement fiber impregnated with a matrix material onto the base member at a controlled

rate in multiple layers in a predetermined pattern dictated by the shape of the object to be formed. The movement of the dispensing head is achieved through drive signals inputted from a computer supported by a CAD/CAM system which contains software to design and create the object to be formed. Jang et al. teach that the fabrication process can be used with filaments impregnated with matrix material in powder form held in a polymeric binder which serves to glue the powder particles to the fiber surface (col. 1-10).

It would have been obvious to one of ordinary skill in the art to have modified the method of Allaire et al. for making a ceramic matrix composite by making the fiber lay-up using a movable dispensing head to dispense the coated continuous fiber or fiber tow, as taught by Jang et al., as a cost-effective fabrication process for forming a composite material object by laying up a filament layer by layer. Using a dispensing head that is movable relative to a base member on which the matrix material coated continuous fiber is to be dispensed to dispense the fiber in layers in a predetermined pattern of the object to be formed by lay-up of the fiber would have been obvious to one of ordinary skill in the art as taught by Jang et al. for making a composite material object from a filament impregnated (coated) with matrix material powder held in a polymeric binder.

Creating a drawing of the object to be formed and generating input signals for directing the dispensing head, as claimed in Claim 7, would have been obvious to one of ordinary skill in the art, as Jang et al. teach that the movement of the dispensing head is achieved through drive signals inputted from a computer supported by a CAD/CAM system which contains software to design and create the object to be formed.

Cutting the continuous fiber after laying a layer, as claimed in Claim 13, would have been obvious to one of ordinary skill in the art to allow the dispensing head to lay additional layers of fiber on previous layers.

(3)

Claims 2, 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 1 above, and further in view of Gardner et al. 5,154,787.

Gardner et al. teach that in making a ceramic composite article from prepreg tow of a continuous fiber infiltrated (coated) with a thermoplastic binder suspension of powdered ceramic matrix material, the prepreg tow is first preheated above the softening point of the thermoplastic binder prior to contact with the collection substrate and tow previously collected on the substrate to insure that the thermoplastic binder is sufficiently softened to fuse to adjoining or underlying strand material during collection. Gardner et al. further teach that compaction pressure on the collected tow can by provided by a roller of weight to achieve a loading of approximately 10 kg on the tow material (col. 3, lines 5-19, col. 9, lines 8-14).

It would have been obvious to one of ordinary skill in the art to have modified the method of the references as combined for making a composite object by preheating the coated continuous fiber or fiber tow before laying the fiber, as taught by Gardner et al., to heat the coated fiber above the softening point of the thermoplastic polymer binder prior to contact with the collection substrate and tow previously collected on the substrate to insure that the thermoplastic binder is sufficiently softened to fuse to adjoining or underlying strand material during collection.

It would have been obvious to one of ordinary skill in the art to have modified the method of the references as combined for making a composite object by applying the pressure to the lay-up of fibers by a roller providing a load of approximately 10 kg, as taught by Gardner et al., to provide compaction pressure on collected tow for making a ceramic composite article. Compressing with a force of 190 Newtons, as claimed in Claim 15 would have been obvious to one of ordinary skill in the art to provide sufficient compaction pressure to reform the array into a relatively dense composite prepreg.

(4)

Claims 3 and 4 rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 1 above, and further in view of Clarke et al. 5,562,966.

Allaire et al. disclose that the fiber can be carbon fiber.

Clarke et al. teach that in using carbon fibers to make a composite such as a ceramic matrix composite to be subjected to high temperatures in an oxidizing environment, the fibers are provided with a uniform, oxidation inhibitor layer of inhibitor such as silicon carbide, boron carbide, boron nitride to protect the carbon fibers from deterioration and erosion due to oxidation (col. 1, lines 9-16, col. 3, line 61 – col. 5, line 15).

It would have been obvious to one of ordinary skill in the art to have modified the method of the references as combined by providing the carbon fiber with an interface layer of silicon carbide, boron carbide or boron nitride, as taught by Clarke et al., to provide carbon fiber used in ceramic matrix composite with an oxidation inhibitor layer to protect the carbon fiber from deterioration and erosion due to oxidation.

(5)

Claims 1, 3-5, 7, 8, 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hilmas et al.6,355,338 in view of Jang et al.

The applied reference, Hilmas et al., has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). For applications filed on or after November 29, 1999, this rejection might also be overcome by showing that the subject matter of the reference and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(l)(1) and § 706.02(l)(2).

Hilmas et al. disclose a method of making a desired architecture from a continuous filament comprising: forming a continuous filament of carbon fiber tow having an interface layer of material such as graphite and material-laden composition of thermoplastic polymer and at least about 40 volume % ceramic or metallic particulate; arranging the continuous filament into a

desired architecture by laying up into a part; laminating by heating and squeezing; heating to burn out the thermoplastic to provide a fiber reinforced composite; and consolidating to form a fully dense fiber reinforced composite (col. 5-9). Hilmas et al. do not disclose laying up the continuous fiber by using a movable assembly to deposit coated fiber on a working surface.

Jang et al. teach that three-dimensional composite material objects can be made in a cost effective fabrication process from continuous fiber reinforced composite material in a layer-by-layer manner by using a dispensing head moved relative to a base member to dispense a mixture of reinforcement fiber impregnated with a matrix material onto the base member at a controlled rate in multiple layers in a predetermined pattern dictated by the shape of the object to be formed. The movement of the dispensing head is achieved through drive signals inputted from a computer supported by a CAD/CAM system which contains software to design and create the object to be formed. Jang et al. teach that the fabrication process can be used with filaments impregnated with matrix material in powder form held in a polymeric binder which serves to glue the powder particles to the fiber surface (col. 1-10).

It would have been obvious to one of ordinary skill in the art to have modified the method of Hilmas et al. for making a desired architecture composite from a continuous carbon tow filament by laying up the continuous filament using a movable dispensing head to dispense the coated continuous fiber or fiber tow, as taught by Jang et al., as a cost-effective fabrication process for forming a composite material object by laying up a filament layer by layer. Using a dispensing head that is movable relative to a base member on which the matrix material coated continuous fiber is to be dispensed to dispense the fiber in layers in a predetermined pattern of the object to be formed by lay-up of the fiber would have been obvious to one of ordinary skill in

the art as taught by Jang et al. for making a composite material object from a filament impregnated (coated) with matrix material powder held in a polymeric binder.

Creating a drawing of the object to be formed and generating input signals for directing the dispensing head, as claimed in Claim 7, would have been obvious to one of ordinary skill in the art, as Jang et al. teach that the movement of the dispensing head is achieved through drive signals inputted from a computer supported by a CAD/CAM system which contains software to design and create the object to be formed.

Cutting the continuous filament after laying a layer, as claimed in Claim 13, would have been obvious to one of ordinary skill in the art to allow the dispensing head to lay additional layers of fiber on previous layers.

(6)

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over the references as applied to claim 1 above, and further in view of Gardner et al. 5,154,787.

Gardner et al. teach that in making a ceramic composite article from prepreg tow of a continuous fiber infiltrated (coated) with a thermoplastic binder suspension of powdered ceramic matrix material, the prepreg tow is first preheated above the softening point of the thermoplastic binder prior to contact with the collection substrate and tow previously collected on the substrate to insure that the thermoplastic binder is sufficiently softened to fuse to adjoining or underlying strand material during collection. Gardner et al. further teach that compaction pressure on the collected tow can by provided by a roller of weight to achieve a loading of approximately 10 kg on the tow material (col. 3, lines 5-19, col. 9, lines 8-14). .

It would have been obvious to one of ordinary skill in the art to have modified the method of the references as combined for making a composite object by preheating the coated continuous fiber tow before laying the fiber, as taught by Gardner et al., to heat the coated fiber above the softening point of the thermoplastic polymer binder prior to contact with the collection substrate and tow previously collected on the substrate to insure that the thermoplastic binder is sufficiently softened to fuse to adjoining or underlying strand material during collection.

It would have been obvious to one of ordinary skill in the art to have modified the method of the references as combined for making a composite object by applying the pressure to the lay-up of filament by a roller providing a load of approximately 10 kg, as taught by Gardner et al., to provide compaction pressure on collected tow for making a ceramic composite article. Compressing with a force of 190 Newtons, as claimed in Claim 15 would have been obvious to one of ordinary skill in the art to provide sufficient compaction pressure for laminating.

Double Patenting

(7)

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

(8)

Claims 1, 3, 5, 7, 8, 12 and 13 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 9 and 10 of U.S. Patent No. 6,355,338 in view of Jang et al. and Allaire et al.

U.S. Patent No. 6,355,338 claims a method for making a green fiber reinforced composite comprising: forming a continuous filament consisting of a carbon fiber, an interface and a material laden polymer composition of thermoplastic polymer and at least about 40 volume % of a ceramic or metallic particulate material; and arranging the continuous filament into a desired architecture to provide a green fiber reinforced composite. U.S. Patent No. 6,355,338 does not claim arranging the filament into a desired architecture by the steps of passing to a movable assembly, depositing, heating, compressing and solidifying.

Jang et al. teach that three-dimensional composite material objects can be made in a cost effective fabrication process from continuous fiber reinforced composite material in a layer-by-layer manner by using a dispensing head moved relative to a base member to dispense a mixture of reinforcement fiber impregnated with a matrix material onto the base member at a controlled rate in multiple layers in a predetermined pattern dictated by the shape of the object to be formed. The movement of the dispensing head is achieved through drive signals inputted from a computer supported by a CAD/CAM system which contains software to design and create the object to be formed. Jang et al. teach that the fabrication process can be used with filaments impregnated with matrix material in powder form held in a polymeric binder which serves to glue the powder particles to the fiber surface (col. 1-10).

Allaire et al. teach that in making a ceramic matrix composite by combining a fiber reinforcement material such as a single fiber or fiber bundle with powdered ceramic matrix material suspended in a thermoplastic vehicle containing thermoplastic polymer to form a coated continuous fiber tow or single fiber; and forming fiber lengths into a fiber-parallel array or lay-up, moderate heat and pressure is applied to reform the array into a relatively dense composite prepreg before heating the prepreg to a binder removal temperature and consolidating to a dense ceramic matrix composite by hot pressing (col. 8, lines 20-42).

It would have been obvious to one of ordinary skill in the art to have modified the method of U.S. Patent No. 6,355,338 for making a desired architecture composite from a continuous carbon tow filament by laying up the continuous filament using a movable dispensing head to dispense the coated continuous fiber or fiber tow, as taught by Jang et al., as a cost-effective fabrication process for forming a composite material object by laying up a filament layer by layer. Using a dispensing head that is movable relative to a base member on which the matrix material coated continuous fiber is to be dispensed to dispense the fiber in layers in a predetermined pattern of the object to be formed by lay-up of the fiber would have been obvious to one of ordinary skill in the art as taught by Jang et al. for making a composite material object from a filament impregnated (coated) with matrix material powder held in a polymeric binder.

Heating and compressing the deposited carbon tow would have been obvious to one of ordinary skill in the, as Allaire et al. teach that moderate heat and pressure is applied to the lay-up of matrix coated fiber to reform the array into a relatively dense composite.

Creating a drawing of the object to be formed and generating input signals for directing the dispensing head, as claimed in Claim 7, would have been obvious to one of ordinary skill in

the art, as Jang et al. teach that the movement of the dispensing head is achieved through drive signals inputted from a computer supported by a CAD/CAM system which contains software to design and create the object to be formed.

Cutting the continuous filament after laying a layer, as claimed in Claim 13, would have been obvious to one of ordinary skill in the art to allow the dispensing head to lay additional layers of fiber on previous layers.

(9)

Claim 2 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over the references as applied to claim 1 above, and further in view of Gardner et al. 5,154,787.

Gardner et al. teach that in making a ceramic composite article from prepreg tow of a continuous fiber infiltrated (coated) with a thermoplastic binder suspension of powdered ceramic matrix material, the prepreg tow is first preheated above the softening point of the thermoplastic binder prior to contact with the collection substrate and tow previously collected on the substrate to insure that the thermoplastic binder is sufficiently softened to fuse to adjoining or underlying strand material during collection. Gardner et al. further teach that compaction pressure on the collected tow can by provided by a roller of weight to achieve a loading of approximately 10 kg on the tow material (col. 3, lines 5-19, col. 9, lines 8-14).

It would have been obvious to one of ordinary skill in the art to have modified the method of the references as combined for making a composite object by preheating the coated continuous fiber or fiber tow before laying the fiber, as taught by Gardner et al., to heat the coated fiber above the softening point of the thermoplastic polymer binder prior to contact with

the collection substrate and tow previously collected on the substrate to insure that the thermoplastic binder is sufficiently softened to fuse to adjoining or underlying strand material during collection.

It would have been obvious to one of ordinary skill in the art to have modified the method of the references as combined for making a composite object by applying the pressure to the lay-up of filament by a roller providing a load of approximately 10 kg, as taught by Gardner et al., to provide compaction pressure on collected tow for making a ceramic composite article. Compressing with a force of 190 Newtons, as claimed in Claim 15 would have been obvious to one of ordinary skill in the art to provide sufficient compaction pressure for laminating.

(10)

Claim 4 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over the references as applied to claim 3 above, and further in view of Clarke et al. 5,562,966.

Clarke et al. teach that in using carbon fibers to make a composite such as a ceramic matrix composite to be subjected to high temperatures in an oxidizing environment, the fibers are provided with a uniform, oxidation inhibitor layer of inhibitor such as silicon carbide, boron carbide, boron nitride to protect the carbon fibers from deterioration and erosion due to oxidation (col. 1, lines 9-16, col. 3, line 61 – col. 5, line 15).

It would have been obvious to one of ordinary skill in the art to have modified the method of the references as combined by providing the carbon fiber with an interface layer of silicon carbide, boron carbide or boron nitride, as taught by Clarke et al., to provide carbon fiber

used in ceramic matrix composite with an oxidation inhibitor layer to protect the carbon fiber from deterioration and erosion due to oxidation.

Allowable Subject Matter

(11)

Claim 6 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

(12)

Claim 1 would be allowable if step (a) was amended to read:

"(a) forming a feed rod having a longitudinal axis and comprising a material-laden polymer composition comprising a thermoplastic polymer and at least about 40 volume % of a ceramic or metallic particulate material;

forming a hole down the longitudinal axis of the feed rod;

inserting the start of a continuous spool of ceramic fiber, metal fiber, or carbon fiber through the hole in the feed rod;

extruding the feed rod and the spool simultaneously to form a continuous filament comprising the material-laden polymer composition completely surrounding the fiber and said filament having an average diameter that is less than the average diameter of the feed rod;" before the step (b) of passing.

Response to Arguments

(13)

Applicant's arguments filed March 5, 2004 have been fully considered but they are not persuasive.

Applicant argues that Allaire et al. describe manually cutting and arranging coated fiber, forming ceramic composite plate and stacking composite pates to be consolidated. Applicant argues that Jang et al. actually describe extruding through a nozzle and fail to disclose a movable assembly that can be used to deposit filament without application of compression force and that provides for heating of deposited filament and application of a compression force to the heated portion. Applicant argues that Clark et al. fail to disclose an interface layer to enhance non-brittle characteristics of the composite as well as oxidation protection

(14)

Allaire et al. and Hilmas et al. each disclose making a ceramic matrix composite by forming a coated fiber or filament of single fiber or fiber bundle having a coating of powdered ceramic matrix material suspended in a thermoplastic vehicle containing thermoplastic polymer to form a coated continuous fiber tow or single fiber, laying up fiber lengths, applying heat and pressure to reform the array into a relatively dense composite prepreg and heating the perform binder removal and consolidating to a dense ceramic matrix composite. Although Allaire et al. may only disclose or suggest manual cutting arranging fiber and Hilmas et al. do not disclose laying up the continuous fiber by using a movable assembly to deposit coated fiber on a working surface, the Jang et al. references provides clear motivation why one of ordinary skill in the art

would have been motivated to use a movable assembly to lay up fiber lengths instead of manually.

As taught by Jang et al., three-dimensional composite material objects can be made in a cost effective fabrication process from continuous fiber reinforced composite material in a layer-by-layer manner by using a computer controlled dispensing head moved relative to a base member to dispense a mixture of reinforcement fiber impregnated with a matrix material onto the base member at a controlled rate in multiple layers in a predetermined pattern dictated by the shape of the object to be formed. This method is advantageous over the numerous prior art methods such as hand lay-up process which is labor intensive and allows for the production of parts of complex geometry not available by the prior art methods (col. 2, lines 39-47). Thus the use of a movable head instead of any of the prior art methods such as manual lay up would have been obvious to one of ordinary skill in the art for the advantages provided. Although Jang et al. may specifically discuss extruding with heating of the coating, this heating during depositing is essentially no different from preheating the filament for deposition. The relevant teaching of Jang et al. is the advantages provided by using a computer controlled dispensing head to deposit fiber.

With respect to the claimed limitation of heating the deposited filament to provide a heated portion of deposited filament and filament layers, Allaire et al. or Hilmas et al. disclose applying heat and pressure to the lay up of fibers. As claimed, Applicant's invention is not limited to heating each filament after deposition. Such heating is suggested by Gardner et al. which maintains the accumulated tow at elevated temperature during collection.

With respect to Clark et al., the reference teaches that in using carbon fibers to make a composite such as a ceramic matrix composite to be subjected to high temperatures in an oxidizing environment, the fibers are provided with a uniform, oxidation inhibitor layer of inhibitor such as silicon carbide, boron carbide, boron nitride to protect the carbon fibers from deterioration and erosion due to oxidation. According to the present specification, interface materials which enhance failure characteristics and oxidation protection include silicon carbide, boron carbide and boron nitride. Since Clark et al. suggest using the same materials as an oxidation inhibitor layer (interface layer) on fibers, the reference suggests an interface layer which enhances failure characteristics and oxidation protection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melvin Curtis Mayes whose telephone number is 571-272-1234. The examiner can normally be reached on Mon-Fri 7:30 AM - 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Crispino can be reached on 571-272-1226. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Melvin Curtis Mayes
Primary Examiner
Art Unit 1734

MCM
May 28, 2004